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$$2^{a_1+6}.3^{a_2+1}.5^{a_3}.7^{a_4}=(2^{a_1+1}-1)(3^{a_2+1}-1)(5^{a_3+1}-1)(7^{a_4+1}-1)\ \ldots\ldots\ (7).$$

Now n may be so taken that

$$3^{a_2+1}-1=(3^{2n+1}-1)(3^{2n+1}+1)(3^{2(2n+1)}+1)(3^{4(2n+1)}+1)\ \ldots\ldots,\ \ldots\ldots\ (8).$$

The last factor written introduces the prime 41, and therefore not more than three factors can be considered. It may easily be shown that $3^{2n+1}-1$ is not divisible by 5 or 7, and that it contains the factor 2 but once. Therefore, $3^{2n+1}-1=2$. Hence, $n=0$. Equation (8) now yields $a_2=1$ or 3.

A trial of each of the eight possible cases produced by every possible combination of the values $a_2=1$ or 3, and $a_1=1$, 2, 3, or 5, will result in finding but one number of the type here considered, namely, $2^5.3^3.5.7$.

MECHANICS.

187. Proposed by **M. E. GRABER, A. M.**, Heidelberg University, Tiffin, Ohio.

Find the path described by a particle acted upon by a central force, the force being directly proportional to the distance of the particle.

Solution by **G. W. GREENWOOD, M. A.**, McKendree College, Lebanon, Ill.

Take coördinate axes through the center of force, and let μ^2 be the force on a particle of unit mass at the unit distance. Then the equations of motion are

$$\frac{d^2x}{dt^2}=-\mu^2 r\cos\theta=-\mu^2 x,\quad \frac{d^2y}{dt^2}=-\mu^2 r\sin\theta=-\mu^2 y.$$

Integrating the equations of motion we have

$$x=a\cos\mu t+b\sin\mu t,\quad y=c\cos\mu t+d\sin\mu t.$$

$\therefore (cx-ay)^2+(dx-by)^2=(bc-ad)^2$, which is an ellipse.

Also solved by **S. A. Corey**, and **Henry Heaton**.

◆

PROBLEMS FOR SOLUTION.

ALGEBRA.

262. Proposed by **REV. R. D. CARMICHAEL**, Hartselle, Ala.

Sum to infinity the series $\dfrac{n}{(4n^2-1)^2}$, beginning with $n=1$, n being always odd.